Amendments to the Specification

The paragraph starting at page 2, line 15 and ending at line 21 has been amended as follows.

In order to improve a printing speed, such an ink jet printing apparatus comprises a print head in which a plurality of print elements are integrally arranged and in which a plurality of ink ejection openings and liquid channels are integrated together. Furthermore, the apparatus is generally provided with a plurality of such print ~~head~~ heads in order to deal with color printing.

The paragraph starting at page 7, line 20 and ending at line 21 has been amended as follows.

In the fourth aspect of the present invention, ~~ther~~ there is provided an ink jet printing apparatus comprising:

The paragraph starting at page 9, line 6 and ending at line 11 has been amended as follows.

selecting a set of plural adjacent ones of the plurality of ejecting portion rows as the ejecting portions on which an ejecting operation is simultaneously performed,

and switching the set to perform a preliminary ejecting operation ~~of~~ for the plurality ~~for~~ of ejecting portion rows sequentially.

The paragraph starting at page 9, line 12 and ending at line 24 has been amended as follows.

In the seventh aspect of the present invention, there is provided a preliminary ejecting method executed using an ink jet printing apparatus that forms an image by ejecting ink from a print head including a plurality of large ejecting portion rows in which large ejecting portions are arranged from which a relatively large amount of ink is ejected during one ejecting operation and a plurality of small ejecting portion rows in which small ejecting portions are arranged from which a relatively small amount of ink is ejected during one ejecting ~~operation, to~~ operation to a print medium, the ink being ejected from the ejecting portions in the print head so that the ejection is not involved in formation of the image, the method comprising the step of:

The paragraph starting at page 11, line 16 and ending at line 21 has been amended as follows.

In Fig. 1, reference numeral 101 denotes an ink jet cartridge. The ink jet cartridge 101 is composed of ~~an~~ ink ~~tank~~ tanks that ~~stores a~~ store black, cyan, magenta, and

yellow ~~tanks~~ ink, and print head 102 having ejection ~~openings row~~ opening rows corresponding to the respective inks. The print head 102 will be described later in detail.

The paragraph starting at page 11, line 22 and ending at page 12, line 10 has been amended as follows.

Reference numeral 103 denotes a paper feeding roller that rotates in the direction of an arrow in the figure while sandwiching a print medium P between itself and a supplementary roller 104, to convey the print medium in a y direction (sub-scanning direction) as required. Further, reference numeral 105 denotes a pair of paper feeding ~~roller~~ rollers that feed print media. Like the rollers 103 and 104, the pair of rollers 105 rotate while sandwiching the print medium P ~~between themselves~~ therebetween. Further, the print medium can be tensed by reducing the rotation speed of the rollers 105 below the rotation speed of the paper feeding roller 103. Reference numeral 106 denotes a carriage on which the print head ~~are~~ is mounted and conveyed and on which four ink jet cartridges 101 are also mounted. Reference numeral 107 denotes a guide rail along which the carriage 106 is scanned over the print medium.

The paragraph starting at page 12, line 11 and ending at line 18 has been amended as follows.

The carriage 106 is scanned from one end to the other end of the print medium. Ink is ejected from each print head 102 to the print medium P to print an image. Once the carriage 106 reaches the other end of the print medium P, the paper feeding roller 103 and ~~others~~ other rollers are rotated to convey the print medium P by a specified amount. An image is formed all over the print medium by repeating the printing operation and the paper feeding operation.

The paragraph starting at page 12, line 19 and ending at line 22 has been amended as follows.

While no printing operation is performed or before the print head 102 ~~are~~ is subjected to a recovery process, the carriage 106 is moved to and stopped at a home position h, shown by a broken line in the figure.

The paragraph starting at page 12, line 25 and ending at page 13, line 11 has been amended as follows.

The print head 102 has ejecting ~~portion~~ portions (hereinafter also referred to as "nozzles") for respective colors arranged on its surface lying opposite the print medium. Reference numeral 201 denotes a yellow nozzle row having nozzles arranged at D dpi, i.e., D nozzles per inch, and from which yellow ink is ejected. The nozzles are arranged in a direction in which the carriage is scanned, i.e., a y direction, which is perpendicular to the

direction of an arrow x. Likewise, reference numeral 202 denotes a nozzle row corresponding to magenta ink. Reference numeral 203 denotes a nozzle row corresponding to cyan ink. Reference numeral 204 denotes a nozzle row corresponding to black ink. These color nozzle rows are arranged in parallel with the carriage scanning direction.

The paragraph starting at page 13, line 12 and ending at line 26 has been amended as follows.

The nozzles are in communication with one another via the corresponding ink tank and ink channel. Accordingly, the vicinity of the ejection opening is always filled with ink supplied by the ink tank. Further, each nozzle is provided with a corresponding heater. Electricity is applied to the heater to generate thermal energy to generate bubbles in the ink. Then, the pressure of the bubbles pushes a predetermined amount of ink out of the nozzle, thus ejecting the ink. In the present embodiment, ink is ejected from the print head on the basis of such a bubble jet ~~(R)~~ method. However, according to the present invention, other ejection methods such as a piezoelectric method may be used to eject ink from the print head. The print head ~~constitute~~ constitutes different housings for the respective ink colors or nozzle rows.

The paragraph starting at page 14, line 17 and ending at page 15, line 5 has been amended as follows.

An operation section 506 comprises keys and the like. This allows an operator to carry out control input and the like. A recovery system control circuit 507 controls a recovery operation such as preliminary ejection in accordance with a recovery process program stored in the RAM 502. Specifically, a recovery system motor 508 drives a print head 513 as well as a cleaning blade 509, a cap 510, and a suction pump 511 arranged opposite and away from the print head 513. Further, a head driving control circuit 515 drivingly controls an ink ejecting electrothermal converter for the print head 513. It also causes the print head 513 to eject ink for preliminary ejection or printing. Furthermore, a carriage driving control circuit 516 and a paper feed control circuit 517 also ~~controls~~ control carriage movement and paper feed, respectively, in accordance with relevant programs.

The paragraph starting at page 16, line 5 and ending at line 11 has been amended as follows.

On the other hand, a preliminary ejection receiver provided at the home position has a width of 5.0 mm. Thus, the yellow, magenta, cyan, and black nozzle rows can be subjected to preliminary ejection without being moved, i.e., without the need to move the carriage. By carrying out preliminary ejection while the carriage is stopped, mists are prevented from flying into the apparatus.

The paragraph starting at page 16, line 12 and ending at line 21 has been amended as follows.

According to the present embodiment, in order to prevent generated mists from whirling up, preliminary ejection is carried out while the carriage on which the print head ~~are~~ is mounted is not performing a scanning operation. Further, all the ink color nozzles ~~are~~ do not simultaneously undergo preliminary ejection, but they sequentially undergo preliminary ejection through a plurality of steps. Furthermore, for each step, nozzle rows subjected to preliminary ejection are selected on the basis of predetermined conditions described below.

The paragraph starting at page 18, line 12 and ending at page 19, line 3 has been amended as follows.

Fig. 4B represents the second step of the preliminary ejection divided into the two steps. After the cyan and magenta preliminary ejections (first step) have ~~been~~ finished, the preliminary ejections 402 and 405 corresponding to yellow and black are carried out. The preliminary ejections 402 and 405 corresponding to yellow and black similarly whirl up the mists 406. However, the distance of the nozzle rows between the yellow and black is larger than that between the magenta and cyan. Accordingly, air currents caused by the succeeding yellow and black ejections and flowing toward the preliminary ejection receiver do not sufficiently reach the whirled-up mists. As a result,

the whirled-up mists are not pushed back but reach a surface of the print head 102. The arriving yellow and black mists stick to the surface of the print head 102 near the nozzle rows 202 and 203 corresponding to magenta and cyan. When the sticking mists enter the magenta and cyan nozzles, the ink colors may be mixed together.

The paragraph starting at page 20, line 7 and ending at line 15 has been amended as follows.

In the present embodiment, preliminary ejection is carried out for each nozzle row while the carriage on which the print head [[are]] is mounted is not performing a scanning operation. Further, a nozzle row subjected to preliminary ejection is sequentially selected starting with the yellow one located at an end of the print head. In Figs. 6A to 6D, reference numerals 201 to 204 and 401 to 406 denote the same elements as those shown in Fig. 4 and having the same reference numerals.

The paragraph starting at page 21, line 23 and ending at line 25 has been amended as follows.

The print head used in the present embodiment ~~are~~ is similar to the print head in Fig. 2, which ~~are~~ is used in Embodiment 1.

The paragraph starting at page 23, line 11 and ending at line 24 has been amended as follows.

In the present embodiment, preliminary ejection is carried out through two steps. That is, the two nozzle rows from the downstream end of the print head in the x direction undergo preliminary ejection during the first step. Then, the two nozzle rows from the upstream end of the print head in the x direction undergo preliminary ejection during the second step. In this case, similar effects can also be produced by the two-step preliminary ejection described below. The three nozzle rows from the downstream end of the print head in the x direction undergo preliminary ejection during the first step. Then, the one nozzle [[rows]] row from the upstream end of the print head in the x direction ~~undergo~~ undergoes preliminary ejection during the second step.

The paragraph starting at page 24, line 13 and ending at line 22 has been amended as follows.

As described above, in an ink jet printing apparatus comprising a plurality of nozzle rows arranged in the main scanning direction and having two preliminary ejecting steps, the plurality of nozzle rows are divided into two groups of adjacently spaced nozzle rows in the main scanning direction. When the two groups are sequentially subjected to preliminary ejection, no mists stick to the surfaces of the print head. This

provides an ink jet printing apparatus that can print desired colors without causing ink color mixture.

The paragraph starting at page 24, line 23 and ending at page 25, line 5 has been amended as follows.

In the present embodiment, an example has been described in which each of two sets of nozzle rows is ~~made from~~ formed of two adjacent ~~two~~ nozzle rows and the two sets of nozzle rows are sequentially selected to be subjected to preliminary ejection. However, the present invention is not limited to this aspect. All the nozzle rows may be divided into sets each of a plurality of adjacent nozzle rows, e.g., six nozzle rows may be divided into two ~~sets,i.e.~~ sets, i.e., three adjacent rows and one row, so that a preliminary ejecting operation can be sequentially performed on these sets.

The paragraph starting at page 27, line 20 and ending at page 28, line 15 has been amended as follows.

In the first step, all the large dot nozzle rows undergo preliminary ejection. The large dot nozzle row for each ink is adjacent to the small dot nozzle row for this color except for yellow. Furthermore, the distance between the large dot nozzle row for each ink and the closest large dot nozzle row is 1.0 mm or less as described above. During preliminary ejection, air currents occur to whirl up mists. Furthermore, the mists collide

against air currents resulting from the simultaneous ejections from the other nozzle rows and are whirled up toward the surfaces of the print head. However, the distance between the nozzle rows on which an ejecting operation is simultaneously performed is short, specifically 1.0 mm. Accordingly, for example, mists generated between the cyan and magenta nozzle rows and between the magenta and yellow nozzle rows are pushed back by air currents resulting from the succeeding preliminary ejection and flowing toward the preliminary ejection receiver. Further, the mists generated are ~~fewer~~ less than those generated together with ink droplets for small dots. Furthermore, the size of the ink droplets resulting in the mists [[are]] is small. Thus, only a few mists are whirled up by air currents, with few of these mists reaching the surfaces of the print head.

The paragraph starting at page 28, line 16 and ending at page 29, line 2 has been amended as follows.

Further, after the first step, it is possible ~~in~~ upon connection with power to subject all the small dot nozzle rows to preliminary ejection during the second step. However, for the yellow ink, both the nozzle rows 801a and 801b provide large dots. There are no small dot nozzle rows for this ink. The distance between the small dot nozzle

rows for magenta 804a and 804b is larger than 1.0 mm. Consequently, mists whirled up between these nozzle rows are likely to reach the yellow nozzle rows 801 without being pushed back by air currents resulting from the succeeding preliminary ejection and flowing toward the preliminary ejection receiver. Thus, the present embodiment is composed of four steps in which the small dot nozzle rows ~~undergoes~~ undergo preliminary ejection one by one.

The paragraph starting at page 30, line 14 and ending at page 31, line 1 has been amended as follows.

However, if the distance between the two adjacent nozzle rows is larger than 1.0 mm and mists generated are insufficiently pushed back, then a large number of mists stick to an area midway between the two nozzle rows on the surfaces of the corresponding print head. When there are no nozzles ~~are~~ located in this area, even if mists ~~sticks~~ stick to it, problems such as color mixture do not occur. Regardless of the intervals at which the nozzle rows are arranged, the simultaneous preliminary ejection from the two adjacent nozzle rows according to Embodiments 2 and 3 is effective in preventing color mixture caused by mists. Further, with the sequential preliminary ejection from each nozzle row according to Embodiment 1, mists are prevented from being whirled up. Therefore, this means is effective regardless of the distance between the nozzle rows.

The paragraph starting at page 31, line 20 and ending at line 27 has been amended as follows.

The present invention has been described in detail with respect to preferred embodiments, and it will now be apparent from the foregoing to those skilled in the art that changes and modifications may be made without departing from the invention in its broader ~~aspect~~ aspects, and it is the intention, therefore, ~~in~~ that the ~~apparent~~ appended claims ~~to~~ cover all such changes and modifications as fall within the true spirit of the invention.